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28 May 1976, Volume 192, No. 4242

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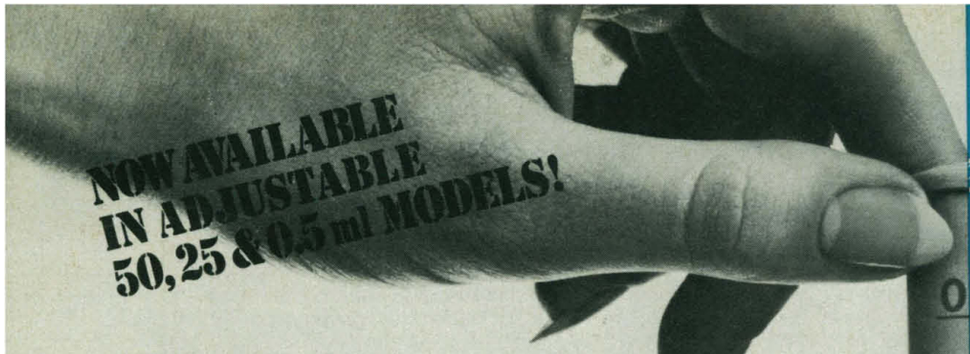

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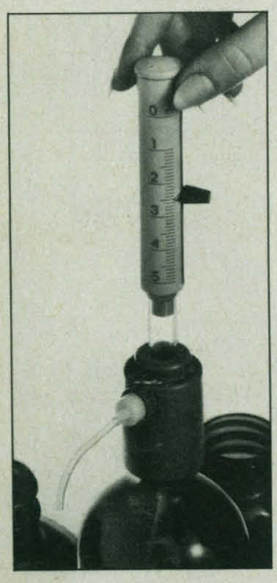

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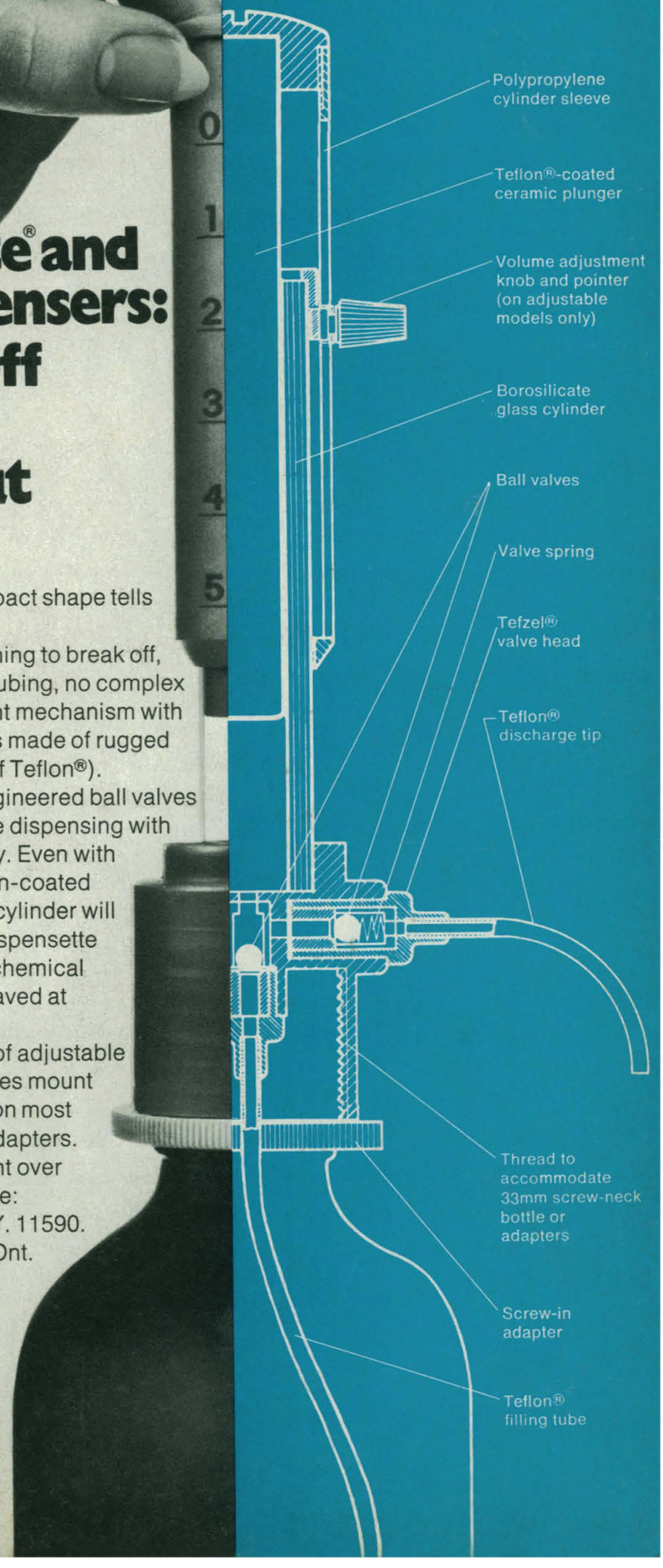

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Volume 192, No. 4242

SCIENCE

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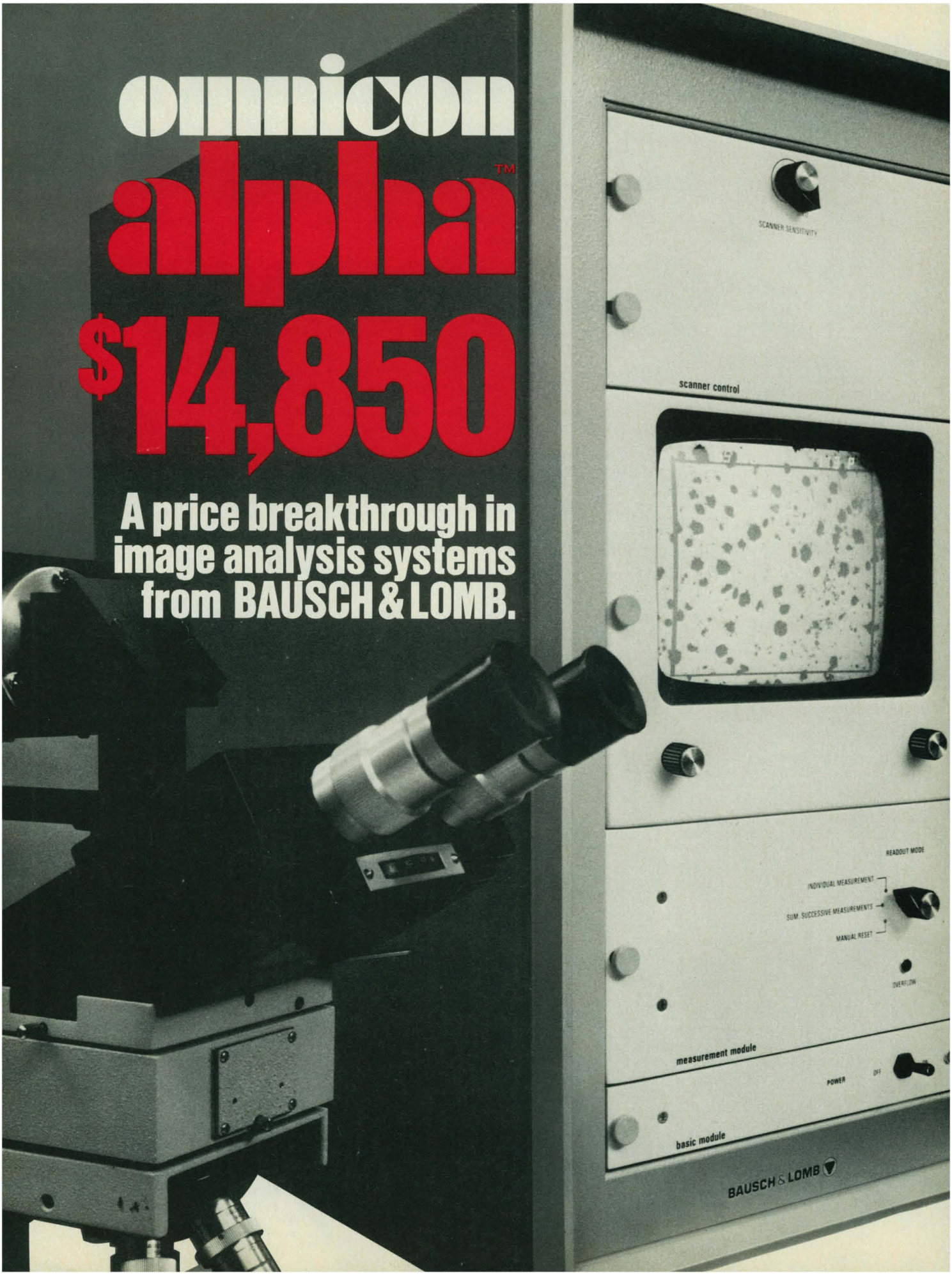
COVER

Hastigerina pelagica (d'Orbigny), a planktonic foraminifer with spines 7 millimeters in length and a bubble with a diameter of 2 millimeters, which serves as a flotation device and housing for numerous dinoflagellate symbionts. Several species of planktonic Foraminifera are hand-collected by scuba diving in the Sargasso Sea and cultured at the Bermuda Biological Station. Gametogenesis was recently observed for the first time in these marine protozoans. See page 890. [Allan W. H. Bé, Lamont-Doherty Geological Observatory, Palisades, New York]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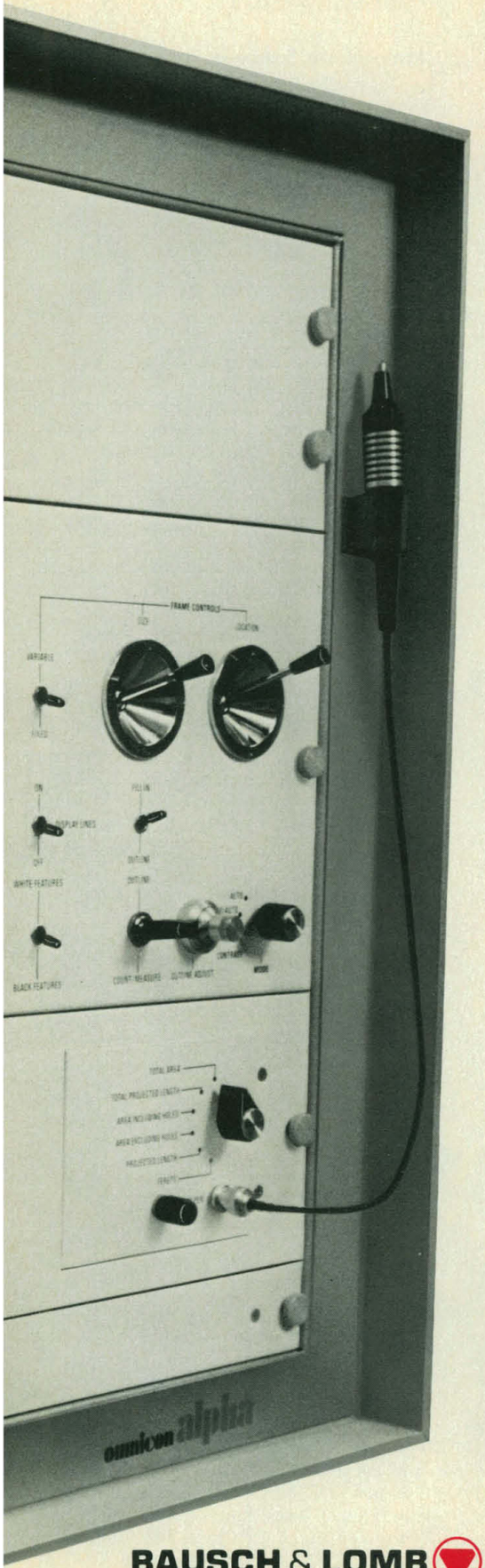

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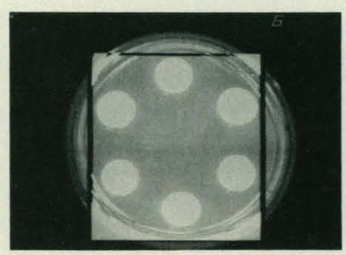

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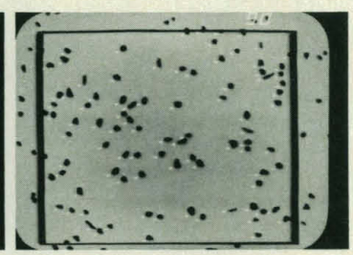

A count in one field of view of particles from a sieve sample.

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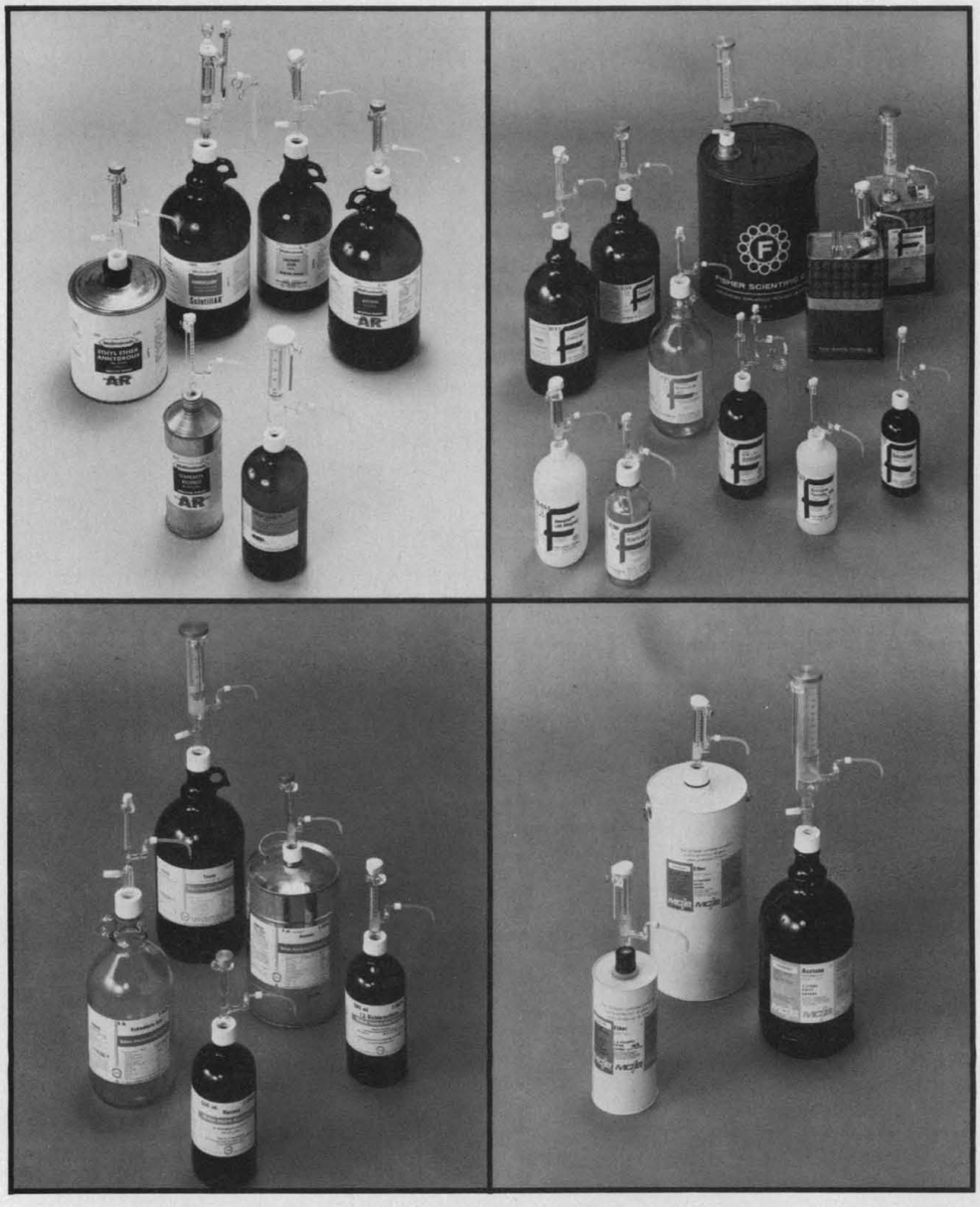

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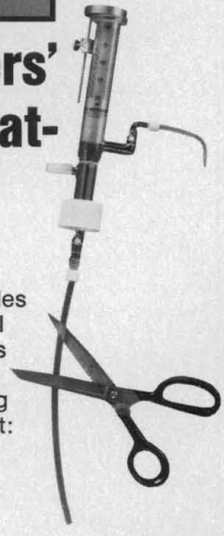

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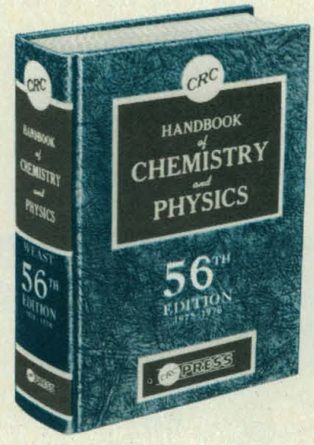

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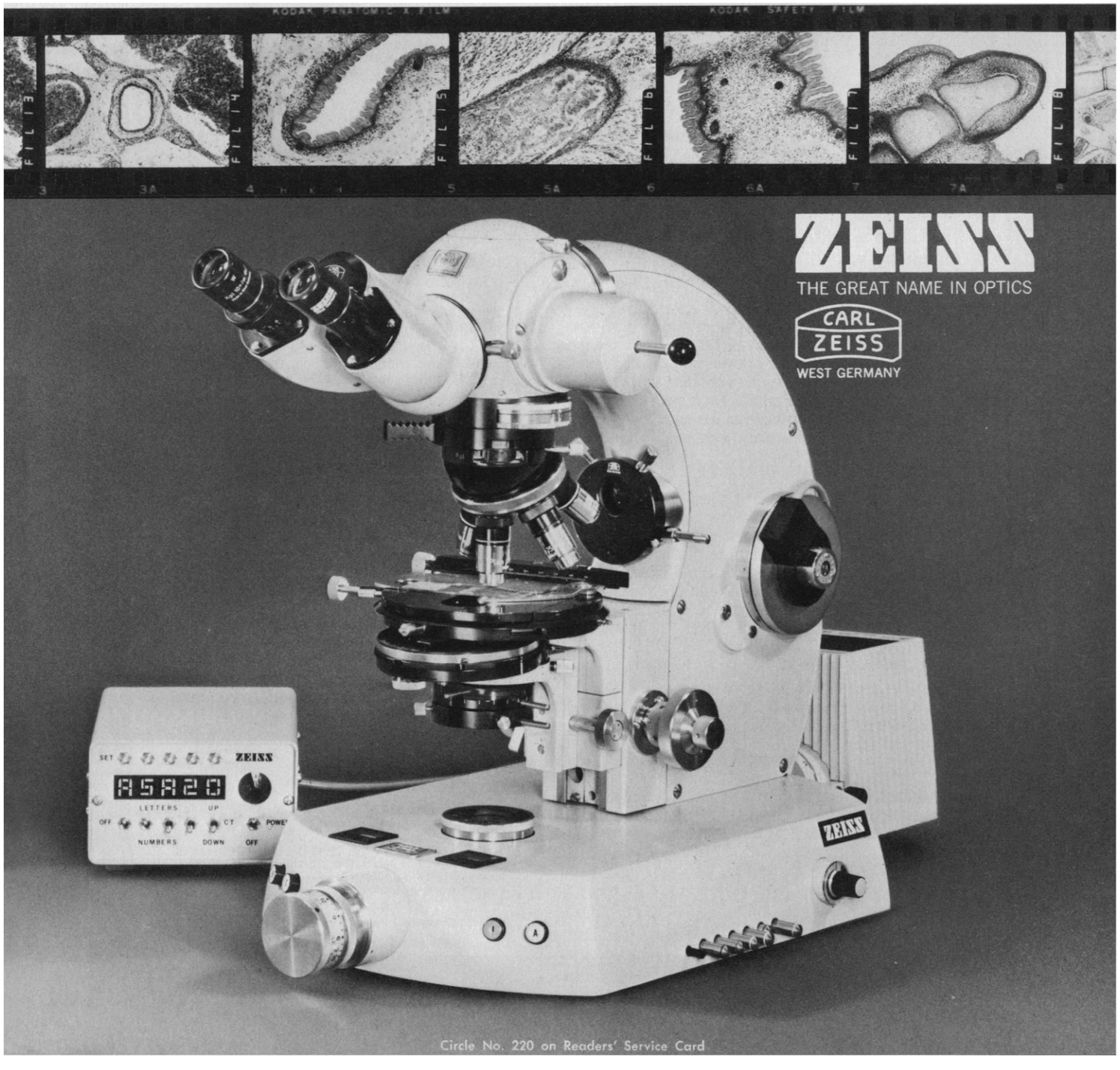

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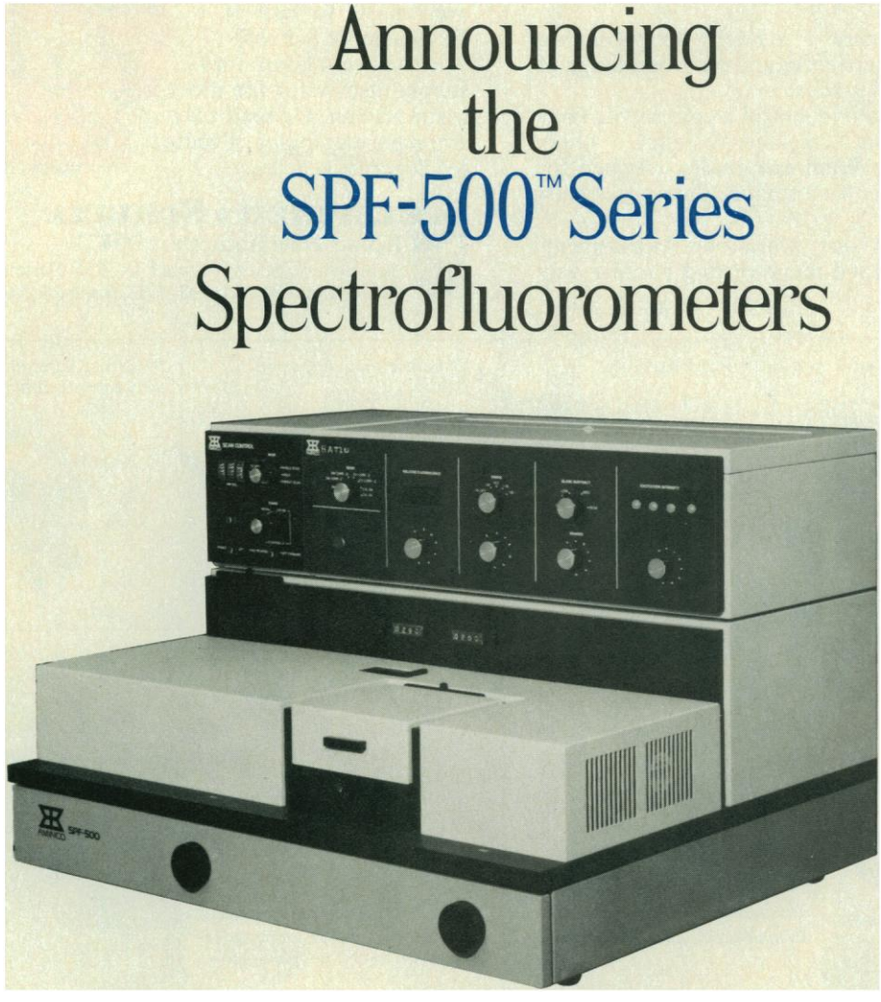

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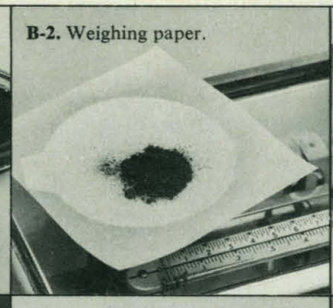
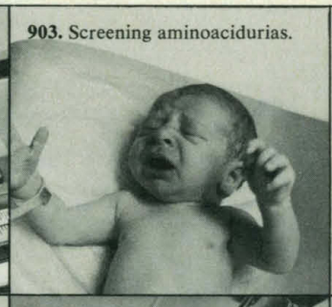
Schleicher & Schuell AG, 8714 Feldbach ZH, Switzerland

740-E. Discs for antibiotic sensitivity testing.

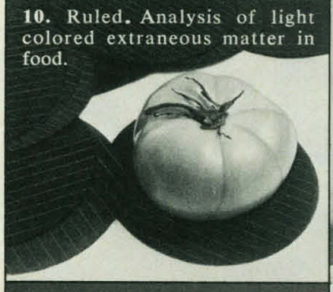


B-2. Weighing paper.

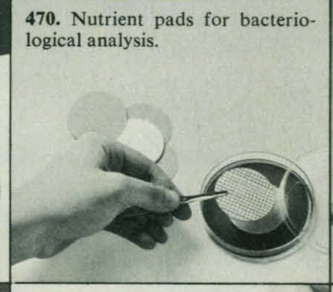


903. Screening aminoacidurias.

576. Wet strengthened paper for very fine precipitates.

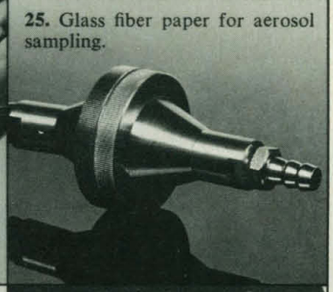


10. Ruled. Analysis of light colored extraneous matter in food.



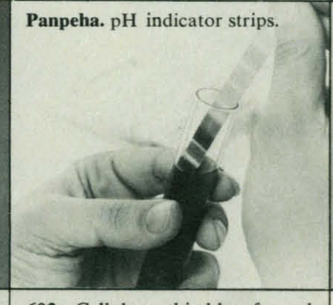
470. Nutrient pads for bacteriological analysis.

588. Folded for liquid clarification.

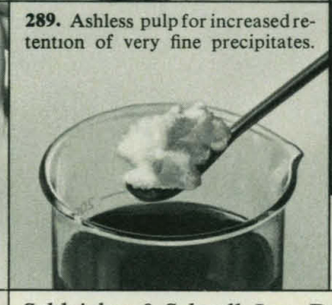


25. Glass fiber paper for aerosol sampling.

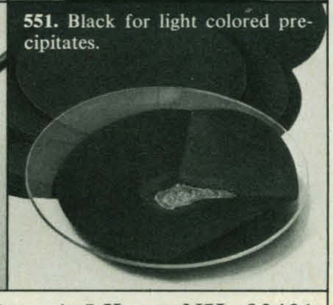
589. White ribbon. Quantitative analysis.



Panpeha. pH indicator strips.

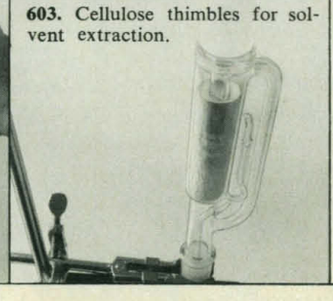


289. Ashless pulp for increased retention of very fine precipitates.



551. Black for light colored precipitates.

595 Hy. Phase separation without separatory funnel.



603. Cellulose thimbles for solvent extraction.

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LETTERS

Two Disciplines

Gerald M. Edelman touches on important issues in his editorial "Scientific quests and governmental principles" (9 Apr., p. 99). He makes some good points, but also some not-so-good ones. What moves me to overt disagreement is the following argument as I understand it. The politico-legal and the scientific disciplines are distinct, different, and "rarely intersect." This leads them (and presumably their followers) to extreme and antagonistic ideological positions that are "dangerous as well as erroneous." These cannot be fully understood or resolved until we understand "how the brain itself produces thought and language."

My unpremeditated reaction is that we risk first experiencing a cold day in Hell if we must await that achievement. I am not pessimistic about the capabilities of the neurosciences, although the task Edelman sets is no mean one. I am more influenced by the dire social conflicts that are already upon us and that are now consigning many lives daily to whichever postulated ultimate fate. The travail of the Irish and the Lebanese, for example, is almost purely within the politico-legal "discipline," if that includes the religious. With "politico-legal" conflict everywhere rising and value-driven fire storms threatening, we can hardly wait to "know better how the brain works."

Actually, cognitive and normative knowledge processing each have a constructive tradition and a long history of interaction. The practitioners of one far from always disagree with practitioners of the other. Edelman wisely urges a greater mixing of the two. It is only through a combination of the best in both traditions that real progress can be made. In fact, we need more effective incorporation of knowledge from all constructive traditions into decision-making; existing mechanisms at the social level are failing to provide it. Whatever the relation of agreed-upon facts and not-agreed-upon values in the mechanisms of the brain, there will remain the *social* problem of accommodating many behavioral streams into a not too disharmonious ensemble. Despite the advantages and attractiveness of greater knowledge of mechanisms in the brain, we can't wait nor can we give all our energies to contemplation of even a neuro-navel.

CLIFFORD GROBSTEIN
Office of the Vice Chancellor, University Relations, University of California, San Diego, La Jolla 92093

Of course, scientific and normative approaches to human knowledge have a long history of interaction. But in modern times, there are peculiar difficulties of understanding that have become particularly crucial with the increasingly rapid societal adoption of scientific technology. Grobstein and I apparently do not mean the same thing by "interaction." I mean acts or decisions based upon a *mutual* understanding of the limits of both scientific and legal disciplines. It is this understanding that I feel should be encouraged among practioners of science and of government.

Much of Grobstein's letter is inspired by his mistaking my suggestions for fuller resolution of ideological conflicts that arise from a failure of this understanding. I did not propose or imply by these suggestions a moratorium on practical or pressing goals. Although I still recommend deepening our knowledge of brains and language, I am astonished at his inference that this reflects an unconcern for our present historical agonies.

It is always tempting to impute a lack of common sense or of moral concern to those who suggest long-range approaches to important social matters. While sharing Grobstein's moral concern, I do not feel that looking for the physical bases of thought and language will distract us from our moral duties, nor do I suggest giving *all* our energies to the task. In any case, I am not as sure as Grobstein that one can predict how long a fundamental answer to this key problem of neurobiology will take. Although knowing how the brain works will not solve our moral dilemmas, it will, I think, prevent us from adopting egregiously stupid ideologies. And possibly, it may suggest some epistemological limits to apply to both cognitive *and* normative matters.

GERALD M. EDELMAN
The Rockefeller University, New York 10021

Ice-Age Vegetation

In the otherwise excellent CLIMAP (*1*) survey "The surface of the ice-age earth" (19 Mar., p. 1131) an ambivalent description of land surface properties is shown in figure 1. Vegetational equivalents of albedo estimates in places seem to contradict geological data established by pollen analysis and dated by radiocarbon.

This is especially true for category E, described in the figure legend as having an albedo below 20 percent and com-

posed of forested or thickly vegetated land. It dominates much of the United States, Central America, Brazil, northwestern Europe, equatorial Africa, India, China, Indonesia, New Guinea, and Australia. It is well established that within the lands listed above there were large areas of rocky deserts, tundra, prairie, or lightly vegetated savanna. While an albedo below 20 percent may apply to such surfaces as well, the caption may mislead the reader and give the impression that unglaciated land was mainly forested.

Because of decreased ocean areas, as well as water temperatures, an almost worldwide drop in Pleniglacial precipitation is indicated by both theoretical studies and field observations (*2*). This should be a key factor in long-term climate prediction. For a number of areas ranging from central Africa to northern Australia there has already been a reduction of precipitation on the order of 50 percent within the last 3000 years (*3*). With the aid of Landsat photography, it would appear to be highly desirable to plot accurately the area and directions of the vast late Pleistocene dunes that are today partly covered by vegetation. This would help provide an independent check for the general circulation models based on CLIMAP's valuable sea-temperature and albedo data.

RHODES W. FAIRBRIDGE
Department of Geology, Columbia University, New York 10027

References

1. CLIMAP is an acronym for Climate: Long-Range Investigation Mapping and Prediction.
2. R. W. Fairbridge, *Nature (London)* **196**, 108 (1962); in *Problems in Paleoclimatology*, A. E. M. Nairn, Ed. [Interscience (Wiley), New York, 1964], p. 356; *Quat. Res.* **2**, 283 (1972); J. Williams, in *Quaternary Environments*, W. C. Mahoney, Ed. (Geographical Monograph, York University, Toronto, 1974), pp. 295–310.
3. E. M. Van Zinderen Bakker, *Palaeoecology of Africa* (Balkema, Cape Town, South Africa, series 1950 to present); A. Rapp, *A Review of Desertification in Africa* (Secretariat for International Ecology, Stockholm, Sweden, 1974); J. Bowler, paper presented at the Australian Conference on Climate and Climate Change, Melbourne, Australia, 1975.

The legend for figure 1 in our article could indeed be misleading, inasmuch as it does not clearly state that the land surface is classified according to its relative reflectivity while the reference to vegetational cover is made only to illustrate typical examples of surfaces possessing the corresponding albedo. The low reflectivity class (E) includes not only forests, green dense vegetation of tundras, prairies, and savannas but also dry shrublands on dark lateritic soils, or stony deserts with frequent varnish. Only the first two types of cover, which

were most abundant, were mentioned in the legend.

Reconstruction of the past vegetation was the first step in assessing the albedo values (*1*). Next, an estimate of the present large-scale albedo of a similar vegetational type on a similar soil was made using aerial albedo measurements (*2*) and relative surface brightness observed from satellites (*3*). It was assumed that the bare soil reflectivity 18,000 years ago did not significantly differ from that in the present, except for areas with fossil late Pleistocene sand dunes or loess.

We would appreciate all relevant information that could help us upgrade the present rudimentary map of the earth's surface 18,000 years ago.

A. McINTYRE
G. KUKLA

Lamont-Doherty Geological Observatory, Columbia University, Palisades, New York 10964

References

1. B. S. Vuilleumier, *Science* **173**, 771 (1971). A map of vegetation 18,000 years ago appeared in G. Kukla, *Nat. Hist.* **85**, 56 (April 1976).
2. E. C. Kung, R. A. Bryson, D. H. Lenschow, *Mon. Weather Rev.* **92**, 543 (1964).
3. Environmental Data Service, *Key to Meteorological Records, Documentation No. 5.327* (National Oceanic and Oceanic Administration, Silver Spring, Md., 1972); unpublished NOAA photographs.

Climatology Conference

The First Miami Conference on Isotope Climatology and Paleoclimatology (*1*) was held 16 to 22 November 1975, chaired by Cesare Emiliani and Willard F. Libby. Eighty-four scientists from ten countries attended and agreed on the following salient points:

1) Ice ages have been the normal condition during the last several million years, with temperate climates enduring only about 5 percent of the time.

2) Because the global food supply depends primarily on climate, current understanding of climate must be vastly improved in order to meet the challenge of tomorrow's food supply. We possess the methods and techniques to establish climate history and only a concerted effort is needed to do that.

The conferees agreed that, in particular, study of the climatic history of the past 10,000 years (the Holocene), using the isotopic record of marine shells, corals, foraminifera, and tree rings together with accurate radiocarbon dating and focusing on the occurrence of extreme climatic conditions, should be of highest priority.

Those attending also agreed on the importance of establishing the frequencies modulating climatic change during the last 1 million years, using cores from the world oceans and from marginal seas where high rates of sedimentation exist.

Also given high priority at the conference was the study of the geochronology of significant cave and lake deposits, using radiocarbon for dating and oxygen isotopic analysis for identifying climatic trends, plus study of (i) the evolution of polar climates through an expanded program of isotopic analysis of the Greenland and Antarctic Ice, and (ii) the rates of advance and retreat of the world's ice from 8,000 to 18,000 years ago, using radiocarbon dating and oxygen and deuterium isotopic analysis of closely spaced continental samples.

The participants found that a successful attack on the pressing problems of climatic change should encompass the use of all isotopic methods and the international cooperation of all isotope laboratories involved in climatic studies. They suggested an International Decade of Isotope Climatology Study, beginning with a close comparison of isotope standards, and the establishment of an Isotope Data Bank and an information center in Miami.

WILLARD F. LIBBY
Department of Chemistry, University of California, Los Angeles 90024

References

1. Supported by the National Science Foundation, Eugene Bierly, monitor.

Hepatitis B Vaccine: Disclaimer

Witold J. Brzosco, a former research associate of mine at the National Institute of Hygiene in Warsaw, implies in a letter to the editor (7 Nov. 1975, p. 510) that our group directly participated in the development of a hepatitis B vaccine. I feel obliged to inform you that the National Institute of Hygiene group, headed by myself, has never been involved in the preparation of any hepatitis B vaccine or any hepatitis B virus materials meant to be used as a vaccine. While still working in our department as an independent researcher, Brzosco isolated and treated with formalin the hepatitis B surface antigen which he subsequently used for skin testing of patients at the Infectious Diseases Clinic of the Warsaw Medical Academy, where he is now employed.

ADAM NOWOSŁAWSKI
Department of Immunopathology, National Institute of Hygiene, 00-791 Warsaw, Poland

28 May 1976, Volume 192, Number 4242 **SCIENCE**

Atomic Bomb Radiation Studies in Japan

The Atomic Bomb Casualty Commission (ABCC) in Japan was organized in 1947 under the supervision of the U.S. National Academy of Sciences (NAS) for the purpose of detecting late radiation effects in the people of Hiroshima and Nagasaki who were exposed to the atomic bombs in 1945. The ABCC was funded almost entirely by the U.S. Atomic Energy Commission, although major research projects were under the joint sponsorship of the Japanese National Institute of Health and the NAS.

In 1975, 30 years after the war and after 28 years of continuous operation, ABCC was reorganized as the Radiation Effects Research Foundation (RERF), a private nonprofit foundation funded equally by Japan and the United States. American support is through the NAS under contracts with the Energy Research and Development Administration (ERDA), the National Cancer Institute, and the National Heart and Lung Institute; the responsibility for American staffing and supervision rests with the NAS. Japanese support and direction are provided by the Ministry of Health and Welfare.

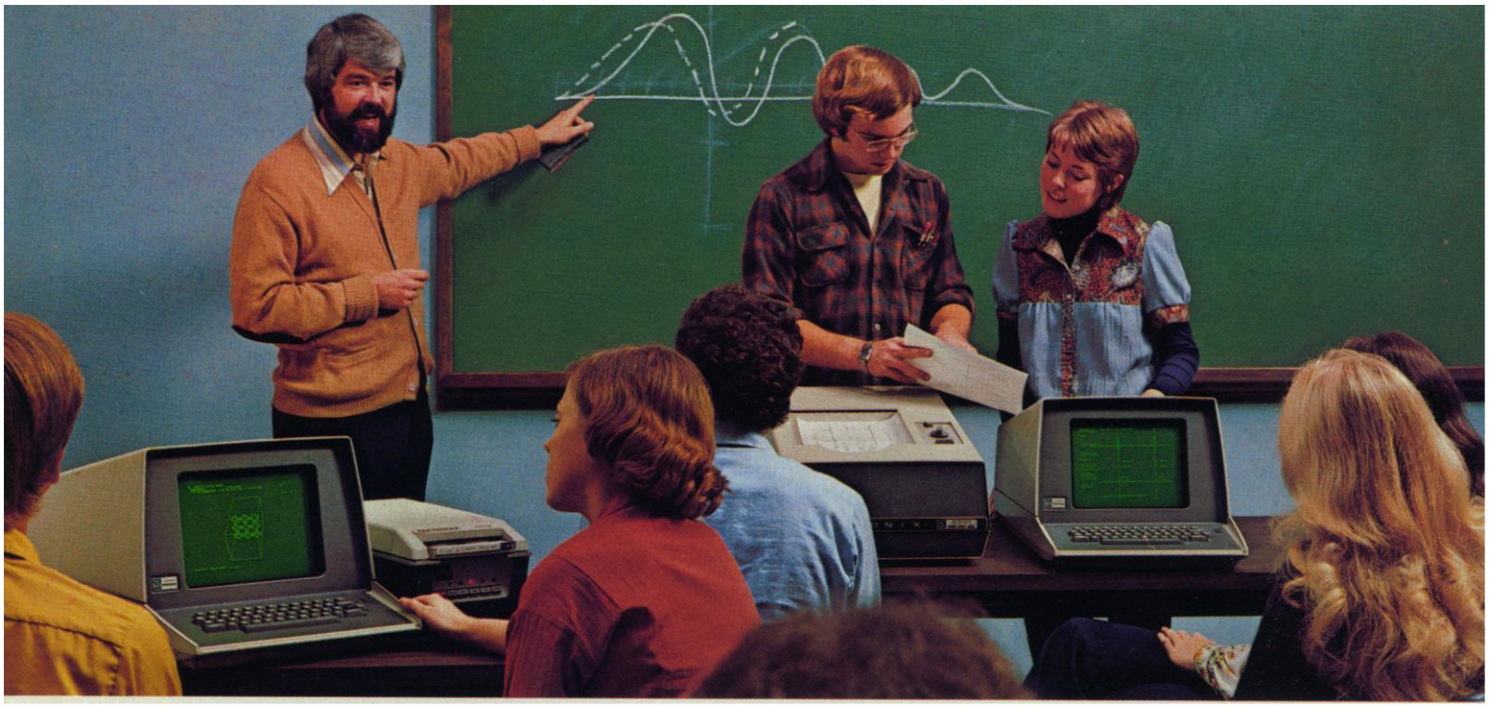
The RERF offices, laboratories, and examination facilities are maintained in both Hiroshima and Nagasaki, where adult health examinations, autopsies, clinical research, and epidemiologic studies are conducted. Of the 576 RERF employees, most of the 46 professional members of the staff are Japanese. At present five physicians and three statisticians are Americans.

A number of important radiation-related clinical disorders and abnormalities have been detected in the atomic bomb survivors. The most notable of these have been increased occurrences of lenticular opacities, thyroid tumors, leukemia, chromosome aberrations in the peripheral blood lymphocytes, and a slight impairment of growth and development of those exposed early in life. Microcephaly and mental retardation have been noted in some of those exposed in utero, especially if significant exposure occurred during the early period of gestation. Recent findings indicate an increased incidence of solid tumors among the more heavily irradiated survivors. This increase has been most apparent for breast and lung cancers, but it may extend to cancer of the stomach and several other specific sites.

Extensive clinical observation of newborn children in both cities during the early years of ABCC did not demonstrate any evidence of hereditary abnormalities attributable to parental exposure. Other major studies have shown no evidence of diminution of fertility, acceleration of aging, or progression of the minimal lenticular lesions. No new or unusual clinical disorders have been observed that could be characterized as specifically and solely due to atomic bomb exposure.

The RERF plans to continue its health examination and autopsy surveillance. Particular attention now is being focused on the immunologic competence of the exposed survivors through studies of lymphocyte function. In addition, the first-generation offspring are being reexamined for evidence of possible genetic effects by using cytogenetic techniques and through a comprehensive biochemical search for serum and erythrocyte protein variants. The development of active Tumor and Tissue Registry programs in Hiroshima and Nagasaki has greatly increased the epidemiologic capabilities for detecting radiation-induced cancers in the exposed populations.

The failure to detect genetic effects thus far has been reassuring to the exposed survivors and their children, although early studies dealt only with gross structural defects. The current search for mutations at the molecular level represents a more definitive approach to the identification of radiation-induced genetic effects in the survivors' children. The persistence of an increased risk of cancer 30 years after exposure clearly indicates that the Foundation must continue its study of delayed radiation effects among the atomic bomb survivors.—STUART C. FINCH and HOWARD B. HAMILTON, *Radiation Effects Research Foundation, 5-2 Hijiyama Park, Hiroshima 730, Japan*



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Newly offered instrumentation, apparatus, and laboratory materials of interest to researchers in all disciplines in academic, industrial, and government organizations are featured in this space. Emphasis is given to purpose, chief characteristics, and availability of products and materials. Endorsement by *Science* or AAAS is not implied. Additional information may be obtained from the manufacturers or suppliers named by circling the appropriate number on the Readers' Service Card (on pages 842A and 914A) and placing it in the mailbox. Postage is free. —RICHARD G. SOMMER

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Ultraviolet-Visible Spectrophotometer

Model 556 (Fig. 1) is a double-beam, dual-wavelength instrument. The main optical unit is accessible from four sides and is adaptable to a variety of sampling devices. There are two monochromators and the unit is equipped with both deuterium and tungsten-halogen sources. Wavelengths from 190 to 900 nanometers are scanned with automatic switching of sources during each scan. The chopping speed is 240 hertz to allow measurement of fast kinetic or stopped-flow phenomena. Perkin-Elmer. Circle 679.

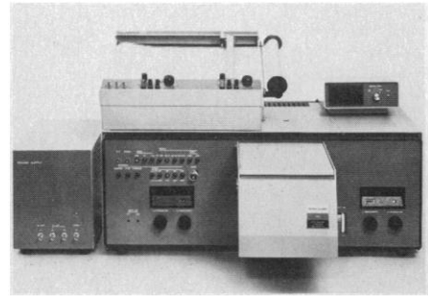

Fig. 1. The model 556 dual wavelength, double-beam ultraviolet-visible spectrophotometer from Coleman Instruments Division of Perkin-Elmer includes two monochromators, two sources, and a wavelength range from 190 to 910 nanometers.

Glassware, Cart, and Cage Washing Equipment

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Protein-Peptide Sequencer

The model 4020 automatically determines the sequence of more than 20 residues per day from a peptide or protein. A sample is covalently bound to a polystyrene or glass support and packed into one of the two reaction columns. Results obtained with the Edman degradation cycle have a high repetitive yield, low background, and an absence of overlap. The pumping system features five continuously variable flow pumps designed to withstand corrosive effects of reagents. A punched-card programmer controls the various functions. LKB Instruments. Circle 683.

Secondary Ion Mass Spectrometry

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Top-Loading Balances

The DTL Millibalance is calibrated and capable of interfacing with recorders and other analytical instruments. Capacity is 10.0 grams with sensitivity to 0.1 milligram. It has two full-scale ranges: from 0 to 100 milligrams and from 0 to 1000 milligrams. Analog output is from 0 to 10 volts for both ranges. Fifteen to 25 samples may be weighed per minute. Cahn Instruments. Circle 687.

Polarimeter

The DIP-181 measures optical rotation in either positive or negative direction. When a sample is set in the chamber angle of rotation is displayed. Accuracy is 0.002 degree readable to 5 digits. Sodium and mercury lamps provide the standard wavelengths (sodium at 589 nanometers and mercury at 405, 435, 546, and 577 nanometers). Scanning is rapid at 1 degree per second. Jasco. Circle 690.

"Transparent" Electron Microscope Grids

Etched beryllium grids are "transparent" to the image-forming beta particles used in transmission electron microscopy. This provides a view of the specimen that is unobstructed by crosslines and markings on the grid. These grids are available in diameters of 2.3 and 3.05 millimeters. Electron Microscope Supplies. Circle 686.

Implantable Pump

The Alzet Osmotic Minipump permits continuous, controlled delivery of biologically active agents into laboratory animals for up to 7 days. This device minimizes handling of animals in certain studies and facilitates establishment of the desired amount of an experimental substance without the fluctuation encountered when oral doses or injections are used. ALZA. Circle 684.

Gas Chromatograph/Mass Spectrometer

The model 4000 features a switchable chemical ionization-electron impact source that offers optimum performance in each mode. A high pressure lens system for focusing in either mode is one unique feature of the system. Selection of mode is accomplished with a single switch and the new mode is operational in 10 seconds. The gas chromatograph features a microprocessor for digital control of temperature and gas flow. It is a dual-column device suitable for both packed and capillary columns. Finnigan. Circle 691.

Water Filtration

Portable units are available that will filter 8 to 16 liters of tap water in 20 minutes; they remove particles including ones smaller than 1 micron in diameter.

They are designed with a closed circuit, recirculating system that features a low cost cartridge-loading combination depth and membrane filter. Each cartridge will clean from 500 to 1000 gallons of tap water. Eastern Analytical Laboratories. Circle 682.

Literature

Ozone Analyzer is a four-page bulletin devoted to the model 560 and its applications. Analytical Instrument Development. Circle 692.

Automatic Calcimeter details an instrument for total calcium determinations. Fiske Associates. Circle 693.

Polyacrylamide Gel Electrophoresis is the subject of a tabloid catalog. Gels, gel-forming equipment, and reagents are included. Isolab. Circle 694.

Reagents for Acrylamide Gel Electrophoresis includes items from ADA to DL-valine. Eastman Organic Chemicals. Circle 695.

Reversed Phase Chromatography products are listed in a catalog. EM Laboratories. Circle 696.

Colorimeter Outfits describes the model TRL device for field and laboratory use. LaMotte. Circle 697.

Multiple Dialyzers is devoted to three new models for the separation of colloidal and crystalloid molecules. Pope Scientific. Circle 698.

Scintrex is a liquid scintillation counting catalog that features a complete line of cocktails, solvents, fluors, gelling agents, solubilizers, and others. J. T. Baker Chemical. Circle 699.

Chemical Reagent and Laboratory Equipment Catalog is indexed and includes reference books as well. Pierce Chemical. Circle 700.

Gases and Equipment for Analytical Instrumentation describes pure gases and gas mixtures as well as flow control and purification equipment. Matheson. Circle 701.

Chemware Laboratory Products catalogs a line of Teflon vessels and laboratory ware. Chemplast. Circle 702.

Handbook of Lipids, Carbohydrates, Amino Acids and Reagents is a 150-page compendium of chemicals that includes an index and ample structural formulas. Supelco. Circle 703.

Oil-Free Turbomolecular Pumps lists a line of pumps for a variety of research applications. Alcatel Vacuum Products. Circle 704.

Data Acquisition and Distribution Systems features the series AN5400 computer-compatible modular device. Analogic. Circle 705.

BOOKS RECEIVED

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